

# **PROTEIN SYNTHESIS IN THE SKIN AND ITS RELATIONSHIP TO WOOL GROWTH, DIETARY PROTEIN SOURCE AND FEEDING PATTERNS IN YOUNG MERINO SHEEP**

S.M. LIU, D.G. MASTERS, G. MATA and S. FIGLIOMENI

CSIRO Division of Animal Production and CRC for Premium Quality Wool, Private Bag PO, Wembley, WA 6014

Skin provides the nutritional environment for the wool follicle. While there is significant research emphasis on the relationship between wool growth and wool follicle activity, there is less on the relationship between wool growth and changes in the metabolism of the skin as a whole. This experiment quantified the responses in protein synthesis in the skin and wool simultaneously in young Merino sheep offered dietary protein as canola meal or lupin seed in different feeding regimens.

Two groups of 24 Merino weaners (five months old and weighing 27 kg) were fed either a diet containing (g/kg DM) canola meal (253), hay (714), urea (10) and minerals (23), or the same diet but with lupin seed replacing the canola meal. Within each dietary treatment and in each of two months, half of the weaners were fed the diet continuously, the other half were fed the diet for two weeks followed by two weeks of a diet containing (g/kg DM) barley (100), oats (370), hay (497), urea (10) and minerals (23). The weaners were housed, fed a uniform quantity (DM) of diet daily and lost liveweight at 36 g/day. The crude protein (g/kg DM) in the diets containing canola meal, lupins and oats/barley was 155, 151 and 99 respectively and all diets were estimated to have a metabolisable energy concentration of 9.6 MJ/kg DM.

Fractional protein synthesis rate (FSR) in the midside skin was measured in the last two weeks of the two month experimental period, either 3 or 10 days after half the weaners were alternated to the oats/barley diet. As there was no difference between the 3 or 10 day samples the results were pooled. FSR was determined using a flooding-dose of L-[ring-d<sub>3</sub>]phenylalanine (Lobley *et al.* 1992), while protein content and synthesis in the skin were measured as described previously (Liu *et al.* 1997). Wool growth over the previous 28 days was measured on a midside patch and wool protein calculated.

**Table 1. Fractional synthesis rate, synthesis of protein in the skin and wool growth rate**

Protein	Feeding	Protein synthesis in skin		Protein in wool (g/100 cm <sup>2</sup> /day)	Wool protein :Skin protein synthesis
		Fractional rate (%/day)	Synthesis (g/100 cm <sup>2</sup> /day)		
Canola meal	Continuous	17.5	0.239	0.053	0.227
	Alternating	17.2	0.247	0.054	0.225
Lupin seeds	Continuous	15.4	0.202	0.043	0.218
	Alternating	16.2	0.233	0.051	0.220
Standard error of all means		0.56	0.014	0.002	0.010
Significance level <sup>A</sup> :	Protein	< 0.01	= 0.06	< 0.01	= 0.31
	Feeding	= 0.64	= 0.15	= 0.05	= 0.74

<sup>A</sup> All interactions  $P > 0.15$

Both protein synthesis rate and wool growth were responsive to the protein source. Sheep fed the canola meal diet had a higher protein synthesis rate and wool growth than lupin fed sheep ( $P < 0.01$ ). Changing the diets to oats/barley did not cause any reduction in the rate of protein synthesis in the skin or wool growth for at least 10 days. This indicates that the increase in skin protein synthesis resulting from feeding canola meal continued after feeding the meal had stopped.

The ratio of wool protein to protein synthesis in the skin was constant across treatments with 22% of the protein synthesised in the skin used for wool.

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